Running Head: EVALUATING EFFICACY AND PREFERENCE FOR RESPONSE PROMPTS

Evaluating efficacy and preference for prompt type during discrete-trial teaching

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Abstract

The components of discrete-trial teaching (DTT) may be individualized to each learner during instruction (e.g., the type of prompts used). However, there is limited research on the relative efficiency and effectiveness of these different prompt types. In addition, the learner's preference for how they are taught is not always considered. The present study compared relative effectiveness of three prompt types (i.e., a gesture, modelling, physical guidance) to a no-prompt control condition during a receptive identification task with three boys with autism. One participant met the mastery criterion first in the model prompt condition, and two participants in the physical prompt condition. All participants selected the physical prompt during a concurrent-chains preference assessment. In addition, all participants completed a chained task using the most effective prompt type.

Keywords: response prompt, assessment, discrete-trial teaching, concurrent-chains preference assessment, social validity, autism

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Discrete-trial teaching (DTT) is a commonly used procedure, particularly in early intervention settings (Smith, 2001). DTT involves the delivery of single trials involving several core components (Smith, 2001). First, the therapist delivers the instruction (e.g., “show me the circle”). A prompt is delivered to assist the child to respond correctly (e.g., the therapist gestures towards the circle). Finally, the response is reinforced (e.g., praise) or corrected (Smith, 2001). While DTT involves some defining characteristics, the individual components of DTT may be modified. For example, the schedule of reinforcement and the type of prompting strategy employed are often adapted to suit an individual learner.

Minimising errors during instruction may result in robust acquisition and maintenance of skills relative to trial-and-error learning (Touchette & Howard, 1984). In the context of DTT, a variety of prompt types and prompt fading strategies can be utilised to increase the likelihood that the learner will respond correctly (West & Billingsley, 2005). Different types of response prompts include physical guidance, gesturing, modelling, and verbal cues (Wolery & Gast, 1984). These prompting strategies have been used to teach a diverse range of skills such as motor imitation (DeQuinzio, Buffington Townsend, Sturmey, & Poulson, 2007), listener responding (R. Tarbox, Wallace, Penrod, & J. Tarbox, 2007), matching-to-sample tasks (Fisher, Kodak, & Moore, 2007), receptive identification (Grow, Kodak, & Carr, 2014), requesting (Lorah, Gilroy, & Hineline, 2014), and labelling (Miguel & Kobari-Wright, 2013).

A number of studies have examined the relative effectiveness of different prompt types with individual learners. For example, Leaf et al. (2016) compared an echoic prompt to a prompting system whereby the therapist provided three possible answers (i.e., the target and two alternative responses) during the acquisition of labelling skills. Both prompting procedures produced similar rates of accuracy; however, differences were observed in terms of number of trials to criterion and time spent in instruction. Similarly, Kodak, Fuchtman, and Paden (2012) evaluated the extent to which three different forms of verbal prompt increased basic conversation skills in children with autism. The results showed that the effectiveness of various the prompts used differed across the participants. Finally, Lerman, Vorndran, Addison and Kuhn (2004) evaluated the relative effectiveness of teaching receptive skills via response prompts alone, response prompts combined with reinforcement, and reinforcement alone. The data indicated that the various prompt combinations produced differential outcomes with each participant, and that the relative effectiveness of the various combinations varied across participants.

Taken together, existing research suggests that no one means of response prompting is universally effective across participants. The idiosyncratic nature of the findings indicate that response prompting strategies may need to be individualized to the learner and the task. Consistent with this notion, Seaver and Bourrett (2014) recently employed a response-prompt assessment designed to identify the most effective response prompt for participants with autism and developmental disabilities in the context of a block design task. Participants were taught the target skills using a chaining procedure, and a multielement design was utilised to evaluate relative effectiveness of three different prompt types: a combined verbal and gestural prompt, a model prompt, and a physical prompt. The assessment proved to be effective at identifying the most effective prompt type for each participant and demonstrated that, as expected, there was idiosyncratic sensitivity to the three prompting strategies employed.

One further consideration of response-prompt selection that has yet to be evaluated in the literature is learner preference. Including the client in the selection of intervention procedures is considered humane and ethical practice (Hanley, 2010). Learner preference may be particularly important when selecting response prompts given that some learners with autism may find physical contact aversive (Charman & Baird, 2002). Client preference for an intervention can be evaluated with a concurrent-chains preference assessment (e.g., Giles, St. Peter, Pence & Gibson, 2012; Heal & Hanley, 2007; Layer, Hanley, Heal & Tiger, 2008). A concurrent-chains preference assessment typically involves pairing an intervention condition with a specific stimulus (e.g., a colored card). Following exposure to multiple conditions, the participant is given the option to choose one of the stimuli. Following the selection, the learner experiences the intervention that was paired with that stimulus. The stimulus selected on the majority of opportunities is considered the most preferred intervention (Hanley, 2010). For example, Heal and Hanley (2007) assessed pre-school children's preference for various reinforcement systems during instruction. Each condition was paired with a laminated colored card, and following exposure to the different reinforcement systems, the participants chose the type that they preferred. A similar procedure may be applied to learner's choosing the types of prompts they prefer to be used during teaching.

The purpose of the present study was three-fold. First, to replicate and extend the methodology and experimental design strategy employed by Seaver and Bourrett (2014), by evaluating a response-prompt assessment in the context of a receptive identification DTT task for learners with developmental disabilities. Second, to evaluate the extent to which the prompt type deemed as most effective, resulted in the acquisition of skills when used in the context of a different skill domain (i.e., chaining). The third and final aim was to evaluate learner preference for prompt type through the use of a concurrent-chains preference assessment.

Method

Participants and Setting

Three boys (John, Bill, and Christopher) aged between four and five with a diagnosis of autism participated. All three participants attended a university-based clinic offering behavior analytic services to children with language delays. John and Bill communicated vocally using three- to five-word sentences, and Chris communicated using the Picture Exchange Communication System (Bondy & Frost, 1994). For all three participants, their clinical team reported that they could respond to a variety of prompts. However, it was unclear which prompt type may be the most effective to use during teaching of receptive identification tasks. All participants had individualised programmes of work based on assessments conducted using the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) and placed within Level 2 and 3 (i.e., developmental level of between 24 to 48 months; Sundberg, 2008). All sessions were conducted in the participants' usual working space (i.e., a booth with a divider or a separate room). For both John and Chris, a booth was set up within a larger working space where multiple sessions were taking place. Each booth had three sides, one side was 2.43m and the other two sides were 1.56m. For John a fourth side was created using an additional divider to reduce distractions. Bill worked in a separate room (3.4m x 3.45m). During the concurrent-chains preference assessments, an additional divider was also present on which the colored cards were hung. Each participant's regular therapists were present for the majority of sessions to assist with data collection. One to two therapists were positioned in clear view of the stimuli to aid data collection, either to the side of, or behind, the participant.

Materials. Data were collected using experimenter-developed pre-made datasheets, pens, and all sessions were videotaped. The task materials for discrete-trial teaching consisted of stimulus cards and reinforcers. Stimulus cards were printed in color on cardstock and measured 7.4cm x 10.5cm. Receptive identification tasks for feature, function, and class were identified for all three participants (e.g., asking the participant, "what do you eat with?"). The skills targeted for each participant were identified using a combination of the VB-MAPP and consultation with the clinical team. For John and Chris, a listener responding by function task was identified whereby they selected the correct target from a messy array of eight (e.g., “give me the one you eat with”). Bill was required to select the correct target from an array of 10 based on either a feature or function (e.g., “give me the one that barks” and “give me the one that you fly in”). Twelve target stimuli were selected for each participant and randomly assigned to each condition (i.e., three per condition). See Table 1 for the targets employed.

During baseline and training, colored paper was used to cover the table at which the participant sat. A specific color (see below) was associated with each of the three teaching conditions. A piece of the colored paper was pasted onto a piece of card (21cm x 15cm) for the purpose of the preference assessments. For the chained task, the materials used were two Duplo™ block designs (one three-piece that constructed a dog, and one six-piece that constructed a giraffe), and a coat with a zipper.

Assessment of Pre-requisite Skills

All participants had an imitative repertoire, could follow simple instructions, and were not sensitive to physical touch. During probes to identify possible targets for training, the experimenter assessed if they could follow the model and the gesture prompt. To assess if a participant could follow a gesture prompt, the experimenter delivered the instruction (e.g., “give me the green one”). She then pointed to the correct stimulus and waited for the participant to respond. To assess whether the participant could respond to a model prompt, the experimenter delivered the instruction and then picked up the target stimulus and placed it in her other hand. She placed it back in the array and waited for the participant to respond. All three participants responded correctly to these prompt types during probes.

A multiple stimulus without replacement (MSWO; DeLeon & Iwata, 1996) preference assessment was conducted before training commenced to identify colors with a neutral or mid-ranking preference. A piece of each colored paper was pasted onto a card (white, yellow, blue, pink, and purple). The cards were placed in an array equidistant from the participant. The participant was asked to choose one of the cards. Following their selection, the item was removed from the array and the remaining stimuli re-presented. Neutrally preferred colors (i.e., those which were not chosen the most or the least) were selected and a tablecloth of those colors used during sessions. For John and Chris, a pink table cloth was paired with the gesture prompt condition, a purple with the physical prompt, white with the model prompt, and blue with the control. For Bill, the pink tablecloth was paired with the physical prompt, yellow with the gesture prompt, blue with the model prompt, and white with the control.

Response Measurement and Inter-Observer Agreement

Across all sessions and conditions (i.e., DTT, concurrent-chains preference assessment, and chained task), data were collected on datasheets in-vivo or from video-recorded sessions. The primary data collector was either the experimenter or a trained undergraduate or postgraduate psychology student who worked as therapists with the participants. During DTT sessions, data collectors recorded whether a trial was completed correctly or incorrectly, in the presence or absence of the prompt type associated with the condition. The primary dependent measure was independent and correct responses. An independent and correct response was defined as the participant responding accurately following the instruction without a prompt. Correct responding was converted into a percentage by dividing the number of trials with correct and independent responses by the total number of trials in a session multiplied by 100. The second dependent measure was the number of sessions required to attain mastery in one of the conditions. The mastery criterion was at least 90% independent, accurate responses across two consecutive sessions. The condition in which the participant mastered first was considered the most effective prompt type. Finally, during the concurrent-chains preference assessments, we collected data on the number of initial link selections for each intervention. An initial link selection was defined as the card the participant touched when asked to make a choice.

A second trained observer independently collected data in-vivo or from video recording for at least 33% of sessions for all baseline and training sessions during DTT and the chained task. Inter-observer agreement (IOA) was collected by comparing each observer's record on a trial-by-trial basis. An agreement was defined as two observers recording the same outcome for a trial (i.e., whether the participant responded correctly with a prompt or independently, or if an error was made). In addition, IOA data were collected for at least 33% of the concurrent-chains preference assessments on the initial link selection during choice trials. An agreement was defined as two observers independently recording the same selection (i.e., what colored card the participant chose). Inter-observer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements multiplied by 100. Overall agreement was calculated by averaging the obtained agreement percentages across all sessions. During DTT, IOA data were collected for 35.5% of John's sessions and averaged 99.6% (range, 90-100%). For Bill, IOA data were collected for 38.8% of sessions and averaged 100%. For Chris, IOA data were collected for 40% of sessions and averaged 100%. During the chained task, IOA data were taken for 34% of John's sessions and averaged 96% (range, 83-100%). For Bill, IOA data were taken for 36% of sessions and averaged 97.8% (range, 89-100%). For Chris, IOA data were taken for 40% of sessions and averaged 100%. During the concurrent-chains preference assessments, IOA data were collected for 33% of John's sessions and averaged 100%. For Bill, IOA data were collected for 40% of sessions and averaged 100%. For Chris, IOA data were taken for 33% of sessions and averaged 100%.

Treatment integrity data were collected on how accurately the experimenter implemented the procedures using an experimenter-created treatment integrity checklist and calculated on a component-by-component basis. The components of the checklist included whether the experimenter used the correct prompt type and the prescribed time-delay for that session, that the correct materials were present (i.e., table-cloth, stimuli, reinforcer), and that reinforcement was delivered for a correct response and withheld for an incorrect response. Treatment integrity data were collected for a minimum of 33% of all sessions. In addition, treatment integrity IOA data were collected for 33% of those sessions.

For John, treatment integrity data were collected for 34% of DTT sessions and averaged 99.7% (range, 98-100%), and treatment integrity IOA averaged 99.25% (range, 98-100%). For Bill, treatment integrity data were collected for 36% of sessions and averaged 99.9% (range, 99-100%, and treatment integrity IOA 99% (range, 99-100%). For Chris, treatment integrity data were collected for 33% of sessions and averaged 99.7% (range, 95-100%) and treatment integrity IOA averaged 100%. During the chained task, treatment integrity data were taken for 36.8% of John's sessions and averaged 90.8% (range, 85-100%), and treatment integrity IOA averaged 98.8% (range, 94-100%). For Bill, treatment integrity data were taken for 36% of sessions and averaged 98.6% (range, 90-100%), and treatment integrity IOA averaged 100%. For Chris, treatment integrity data were taken for 35% of sessions and averaged 100%, and treatment integrity IOA also averaged 100%.

Experimental Design

An adapted multielement design (Sindelar, Rosenburg, & Wilson, 1985) within a multiple baseline across participants was used to demonstrate experimental control. There was a unique set of instructional stimuli associated with each condition and the participant was exposed to all conditions in a quasi-randomised order. The independent variable was the prompt used to teach the skill (i.e., verbal with a gesture prompt, modelling, or hand-over-hand guidance).

Procedures

Discrete-trial teaching. The general procedure used to teach the skills throughout the study was DTT. This procedure involved delivering instruction in single trials consisting of several components. First, the therapist delivered the instruction (e.g., “give me the one you wear in the rain”). A prompt was delivered to assist the child to respond correctly (e.g., the therapist physically guided the participant to pick up the circle). Following a correct response, reinforcement (e.g., praise or a tangible) was delivered. If a participant made an error or did not respond within 5 seconds, then the materials were removed and the next trial delivered. No error-correction procedure was used as we wanted to evaluate the effectiveness of the prompts in the absence of other teaching strategies. One session consisted of ten trials and no more than four sessions were run in a 3-hour period.

Baseline. During baseline, the experimenter delivered the instruction associated with the receptive identification task (e.g., “give me the one you eat with”). No prompts were delivered. A trial was terminated if the participant made a response or did not respond within five seconds. Reinforcement was delivered contingent on session behavior (e.g., for sitting, waiting, sharing, looking) to ensure compliance with the task.

Training. During training, a progressive time-delay was used across sessions to fade out the prompt (i.e., 0s, 1s, 2s, and 4s). The duration of the time-delay was increased when a participant responded with at least 90% accuracy (i.e., prompted or independent correct responses) across ten trials. If a participant made an error then the stimuli were removed, reinforcement withheld, and the next trial delivered. The duration of the time-delay was decreased when a participants responded with less than 80% accuracy (i.e., prompted or independent correct responses) across one session. Following mastery of the targets in one condition, the same number of trials were run across the other conditions to ensure equal exposure to the prompt types during training.

Gesture Prompt. During this condition, the experimenter delivered the instruction and a gesture prompt in accordance with the assigned time-delay (i.e., after either 0s, 1s, 2s, and

4s). A gesture prompt consisted of touching the correct stimulus in the array with an index finger.

Model Prompt*.* During this condition, the experimenter delivered the instruction and a model prompt in accordance with the assigned time-delay. A model prompt consisted of the experimenter picking up the correct stimulus and placing it in her other hand. She then placed the picture card back on the table for the participant to pick up and put in her hand.

Physical Prompt*.* During this condition, the experimenter delivered the instruction followed by a physical prompt in accordance with the assigned time-delay. The physical prompt that was used was hand-over-hand guidance. Hand-over-hand guidance consisted of the experimenter placing her hand over the participant's hand and guiding the participant to pick up the correct target.

Control. During this condition, following the instruction, no prompts were delivered and reinforcement was withheld following all participant responses. The experimenter removed the materials following all responses or if the participant failed to respond within five seconds, and moved onto the next trial.

Concurrent-chains preference assessment. A concurrent chains preference assessment was then conducted to determine the participants' preference for a particular prompt type. The four cards employed during the MSWO preference assessments were also used during the concurrent chains preference assessments to represent the respective prompt types. Procedures similar to Heal and Hanley (2007) were followed during the concurrent chains preference assessments. Prior to the preference assessments, forced exposure trials were run whereby the experimenter physically guided the participant to choose one of the four colored cards. The selected card was placed on the divider at eye level of the participant just outside their work area. The participant was exposed to one trial of the prompt type condition associated with that card. The participant was exposed to all four conditions five times before the preference assessments were run, with the fifth forced exposure trials occurring directly before preference assessments (Heal & Hanley, 2007).

During the concurrent-chains preference assessment, the participant was asked to choose between one of the four cards (e.g., “choose one”). If the participant did not select a card within five seconds or attempted to select more than one, the experimenter re-presented the instruction. Contingent upon the selection of a card, the participant was led to the corresponding work area where they completed a new set of receptive identification targets with the chosen prompt type. If the participant did not make a selection on the second presentation the trial was terminated.

Chained Task. Following the concurrent-chains preference assessment, a new task was identified that could be taught using chaining. The prompt type identified as the most effective during DTT was used in conjunction with progressive time-delay to teach the skill. The tasks identified were either related to functional living skills or play skills. For Bill, the task was zipping up his coat. For both John and Christopher, the task involved the construction of a block design using Duplo™. For all three participants, the task was taught using backward chaining. During training, the therapist presented the discriminative stimulus (i.e., “zip up your coat” or “build the dog/ giraffe”) and then immediately prompted the participant through the steps of the chain until they reached the appropriate acquisition step. When the participant reached 100% accuracy on the acquisition step, the next step in the chain was trained on the subsequent session. The mastery criterion was completing the entire chain was at least 90% independent accuracy.

Results

The results of the prompt type assessment are depicted in Figure 1. During baseline for all three participants, responding was below chance levels. Following baseline, accuracy initially increased in the gesture prompt for Bill; however, on the fifth session, accuracy in this condition dropped to 80%. Bill then subsequently met the mastery criterion first in the physical prompt condition after six training sessions. Chris reached mastery in the model prompt condition following seven training sessions. John took longer to the reach mastery; following baseline, independent and accurate responding did not increase above chance levels. Following 24 training sessions across the four conditions, the number of targets were reduced from three to two (depicted by the dashed line). Therefore, the array consisted of two targets and six distractors, instead of three targets and five distractors. As independent responding had been at near zero levels for all the targets, we selected the target to exclude at random (see Table 1 for targets which were removed). John subsequently mastered the targets corresponding to the physical prompt condition after a total of 12 training sessions.

Following mastery in the prompt type assessment, the participants underwent the concurrent-chains preference assessment (see Figure 2). Bill chose the gesture prompt on the first session; however, he then chose the physical prompt for nine consecutive sessions. John alternated between all prompt types for 15 sessions and then selected the physical prompt most frequently. Chris alternated between the physical and the model prompt during the first ten sessions. During sessions 11 to 15, he chose the gesture prompt once and the physical prompt on four occasions. However, after 15 sessions, Chris stopped making choices. A sixth set of forced exposure trials were run; however, Chris made no further choices and, thus no further preference assessments were conducted. Based on the choices he had made, his preference was determined as the physical prompt.

All three participants met the mastery criterion for the tasks taught using chaining and the prompt identified as the most effective during discrete-trial teaching. The results are depicted in Figure 3. Bill mastered zipping up his coat after 28 sessions, John mastered the block design after 38 sessions, and Chris mastered the block design after 20 sessions.

Discussion

The present study compared the efficacy of three different response prompt types to a control condition during a receptive identification task. In addition, the participants' preference for the prompt types was evaluated. Finally, the prompt type deemed to be most effective within the context of a receptive identification task was employed within a further skill domain. All participants completed the prompt type assessment, the concurrent-chains preference assessment, and a chained task using the prompt identified as the most effective. John and Bill also completed the concurrent-chains preference assessment and indicated a preference for the prompt type with which they had been most successful. John mastered the targets presented in, and indicated a preference for, the physical prompting condition. He also learned a block design task taught using chaining and physical prompting. Bill also mastered skills in, and indicated a preference for, the physical prompt condition. He learned to zip up his coat using chaining and physical prompting. While Bill demonstrated mastery in the physical prompt condition first, it is noteworthy that the gesture prompt condition was only marginally less effective. Indeed, accuracy during the gestural prompt condition increased more rapidly during the early part of the assessment relative to the physical prompt condition. The most effective prompt type for Chris was the model prompt. However, during the concurrent-chains preference assessment he stopped responding after 15 sessions and the prompt type he had selected the most was the physical prompt. Despite this outcome, he still learned a novel block design using a model prompt during chaining.

The present study replicates and extends the prompt type assessment used by Seaver and Bourret (2014). Discrete-trial training is widely used in skill acquisition programmes within Applied Behavior Analysis (ABA), particularly in the context of early intensive behavioral intervention (Eikeseth, Smith, Jahr, & Eldevik, 2002). The present study demonstrates that the prompt type assessment can also be applied to DTT. In addition, the present study evaluated a clinically relevant skill for participants as opposed to the arbitrary task employed in previous research. The participants received between 6- and 18-hours of ABA per week. It was therefore essential that time was spent on a skill set that complemented their individualized program of work. Our findings extend the analysis reported by Seaver and Bourret (2014) in two additional ways. First, by evaluating participant preference for each of the prompt types employed and, second, by including a control stimulus set to assess the effects of maturation.

Consistent with the findings of Seaver and Bourret (2014), the most effective prompt type varied across the participants who completed the assessment. These differences may have been a function of a range of variables including the type of task, the learner's existing skill repertoire, and a learner's history with particular prompt type (Seaver & Bourret, 2014). For example, we may expect that a gesture prompt and a model prompt to be of similar effectiveness given that they are topographically similar during a receptive identification task. Each, however, requires subtly different prerequisites on the part of the learner; he must be able to respond to an imitative prompt in order to accurately follow a model, and engage in visual tracking in order to respond to a gesture. Furthermore, a learner's experience with a particular prompt type may affect their sensitivity to it. Recent work by Coon and Miguel (2012) demonstrated that typically developing participants learning intraverbals mastered targets faster when they were taught with a prompt type they had been recently exposed to, relative to a prompt type that had not recently been used. This data suggest that familiarity and immediate history with a teaching strategy may alter effectiveness. While these influences were not specifically controlled for in the present study, they are mitigated somewhat given that all three participants were familiar with the response prompts employed, and had been exposed to them all during their regular teaching. Nevertheless, it is possible that their prior experience of the specific response prompts employed contributed to both the skill acquisition and preference outcomes observed.

Given the uncertainty around how learner and task characteristics may impact relative effectiveness, assessing prompt effectiveness on an individualized basis may be more useful than attempting to identify universally effective prompting system. For example, several studies comparing different prompting strategies have also identified idiosyncrasies across participants (e.g., Libby, Weiss, Bancroft & Ahearn, 2008; Leaf, Sheldon, & Sherman, 2010; Leaf et al., 2016). Furthermore, existing reviews on different prompting systems (e.g., Walker, 2008; Wolery & Gast, 1984) avoid making firm recommendations on prompting systems that are invariably effective across individuals.

In addition to using individualized assessments to inform intervention selection, taking client preference into account may also improve the outcomes of an intervention for that individual (Hanley, 2010). The present study assessed client preference for the different prompt types using a concurrent-chains preference assessment. For Bill and John, the most effective and the most preferred prompt types were related (i.e., the physical prompt). In the case of Bill, it could be argued that the gesture prompt was equally effective. Accuracy increased more rapidly in this condition and he reached 90% accuracy after four training sessions. When given a choice; however, he indicated his preference for the physical prompt. In circumstances where there may be several interventions of similar efficacy, client preference may be the most important factor in guiding decision making for selection.

In contrast, there may be circumstances in which the most effective and the most preferred interventions do not match. For Chris, the model prompt conditions produced the most accurate responding; however, he indicated a preference for the physical prompt condition. These outcomes raise some important questions regarding social validity. For example, should prompt type efficacy, or the prompt preference be employed under such circumstances? Unlike the similarity in outcome for the physical and gesture prompts for Bill, the effectiveness of the model and physical prompt for Chris were not similar.

Clinicians may need to consider the ethical implications of selecting a prompt type that is preferred by a learner but is relatively ineffective, or choosing a prompt type which is effective but not preferred. Here, we used the prompt type deemed to have been most effective to teach the chained task in the latter part of the study. Consideration of prompt preference might be most helpful for clinicians when they are tasked with overcoming escape maintained challenging behavior. Although a lack of preference for a particular procedure may not necessarily occasion problem behaviour, incorporating choice of procedures may reduce the risk of problem behavior during instruction (Heal & Hanley, 2007).

It is possible that the physical prompt was most preferred by all the participants because it required the least amount of response effort relative to the other prompts, despite being the most intrusive. For Chris, in particular, his preference for physical prompting did not match the extent to which it was effective relative to the model prompt condition. Future research may consider whether prompt types that initially require less independence on the part of the learner lead to challenges such as prompt dependency. Prompt dependency may develop under circumstances in which both prompted and independent responses receive the same schedule of reinforcement (Cividini-Motta & Ahearn, 2013). The nature of the prompting strategy could contribute to the development of this issue (e.g., if the prompt is faded too slowly). A further issue concerns the fact that Chris stopped making selections entirely after 15 sessions of the concurrent-chains preference assessment. This finding draws in to question the suitability of the teaching procedures that we employed in the study. Future research may consider including a greater range of prompt types for learners to select from (e.g., including both within stimulus and response prompts).

A further limitation of the study concerns the length of time that it took John to complete the prompt type assessment. While he ultimately mastered the receptive identification task, it took him almost twice as long as the other participants to complete the assessment. It is possible that response prompts may not have been be the most effective strategy for him during this type of task. Previous research comparing within-stimulus and response prompting strategies during receptive identification tasks has found within-stimulus prompting to be more effective (e.g., Schreibman, 1975; Graff & Green, 2003). In these studies; however, within-stimulus fading was compared with was a gesture prompt on a progressive time-delay. It is possible that other response prompts as well as other prompt fading strategies (e.g., most-to-least, or least-to-most) may have been more effective. In addition, the studies involving within-stimulus prompting strategies typically comprised of additional incremental fading levels compared to the response prompt condition. For example, the fading condition may gradually change the stimulus over multiple trials, whereas the response prompting condition may fade to the final discrimination more rapidly if it only consisted of several fading levels. Therefore, the conditions may not have been equated, resulting in more time spent in training in the within-stimulus prompting condition. In terms of clinical practice, within-stimulus prompting may not always be a feasible option. For example, if there are several fading increments each requiring an additional set of stimuli, additional preparation time may be needed. Therefore, extra-stimulus prompts may be easier to incorporate in clinical practice. Future research may compare a wider range of both within- and extra-stimulus prompts, as well as consider client preference for these strategies.

The present study replicated a prompt type assessment in the context of DTT. In terms of the external validity of this assessment, we only assessed one additional task taught using the prompt type identified as most effective. It has not yet been determined whether the most effective prompt types identified during the receptive identification task would also be effective at teaching the same receptive identification task again, a different skill set during DTT (e.g., matching), or with other different chained tasks. In addition, this assessment was time consuming to administer and would require streamlining in order to become a viable assessment utilised at the outset of teaching. For example, John underwent 56 training sessions before he reached mastery, with a duration of approximately five minutes per session. One possibility for improving the efficiency of the prompt-type assessment could be to use an alternative research design such as a within-subject multiple probe design across different skill sets (Horner & Baer, 1978).

The present study replicated Seaver and Bourret’s (2014) prompt type assessment. Consistent with their procedures, the assessment concluded once a participant had mastered a set of targets in one of the conditions. The concurrent-chains preference assessment was then run immediately following the completion of the assessment. This strategy may not have been the most efficient approach to assessing preference. One alternative may have been to run the concurrent chains preference assessment every few sessions to determine client preference earlier. During Leaf et al. (2010) client preference for the procedures, a colored mat paired with each procedure was selected every third session, leading to identification of preference much earlier than in the current study. Leaf et al. (2010) note, however, that the evaluation of preference was limited by the fact that no color preference assessment was conducted prior to the assessment. Therefore, the participants may have chosen the mat based on the color that they preferred and not based on the procedure with which it was paired. In addition, evaluating preference before determining the most effective prompt type may not be to the benefit of the learner if their most preferred and the most effective prompt type are not the same (e.g., as demonstrated with Chris).

In conclusion, the present study replicated an assessment developed by Seaver and Bourret (2014) to identify the most effective prompt type in the context of DTT. Our results replicate those findings in that the most effective prompt types were idiosyncratic across participants. The present study extends the literature as it used a concurrent-chains preference assessment to determine client preference for prompt type. For both participants who completed the concurrent-chains preference assessment, the most preferred prompt type was the physical prompt. Future research may consider streamlining the assessment to make it more feasible to complete in a timely manner in a clinical setting and continuing to evaluate the external validity of these procedures.

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Table 1

Participant targets per condition

Participant	Control	Gesture	Physical	Model
Bill	hops	barks	has a hump	has a horn
	gives you bacon	is crunchy	you chew with	you put letters in
	you ride in	you wave with	goes on water	you hear with
John	you wear for safety	you wear in summer	you wear in the rain	you wear in winter
	put shoes on	you learn in	you wash your hands in	put rubbish in
	(play in)[a]	(hear with)	(colour on)	(you wear in the sun)
Chris	you play in	you sit on	you live in	you sleep on
	you wash your hands in	you lie under	you put food on	you write with
	you clean with	you row in	you fly in	you sail in

Note. All targets preceded by the discriminative stimulus “Give me the one which.”

[a] John’s targets which were removed from session 44.

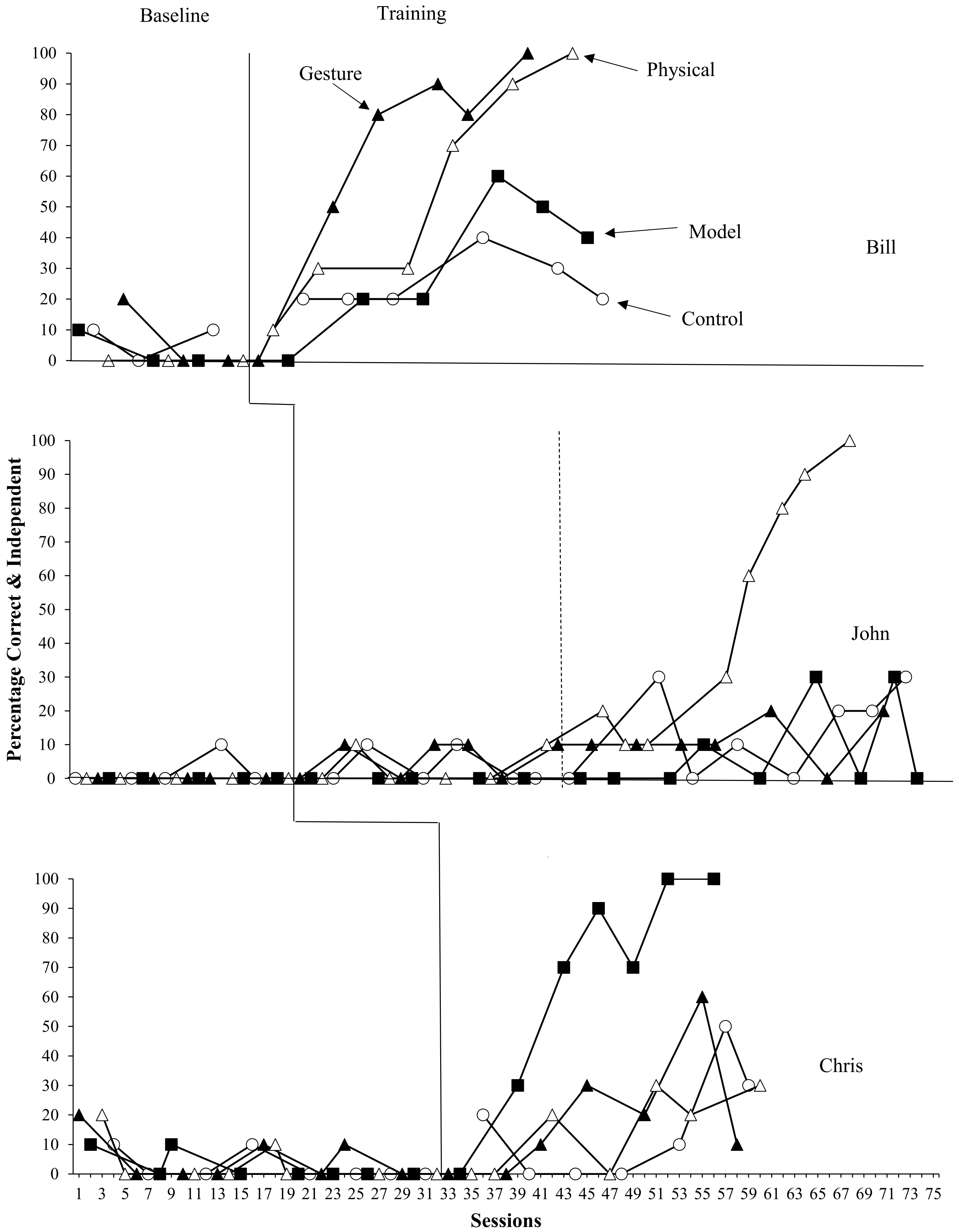

Figure 1. Percentage of correct and independent responding scored during baseline and training in the control (circle), model prompt (square), gesture prompt (closed triangle), and physical prompt (open triangle) conditions.

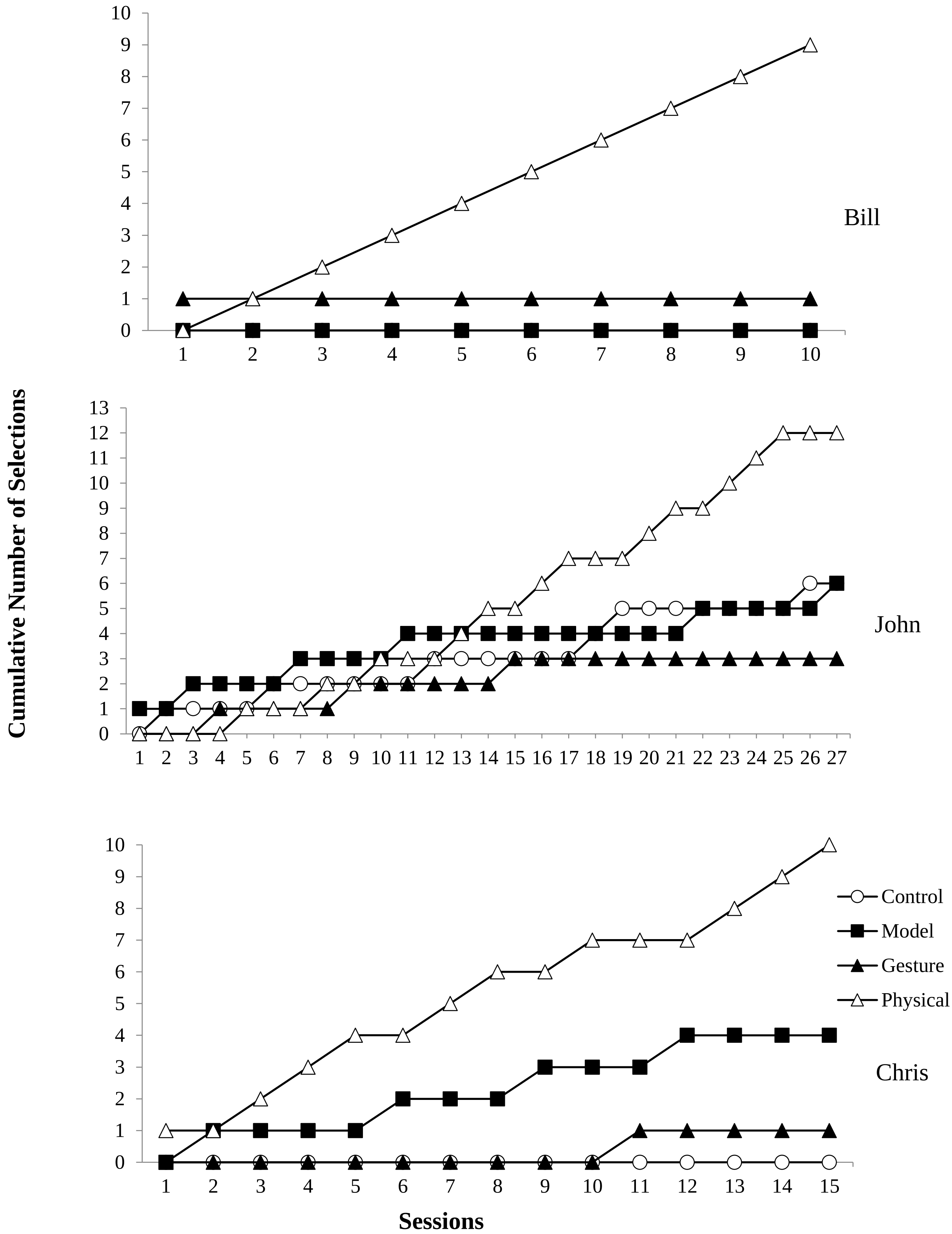

Figure 2. Cumulative number of selections of prompt type for Bill, John, and Chris.

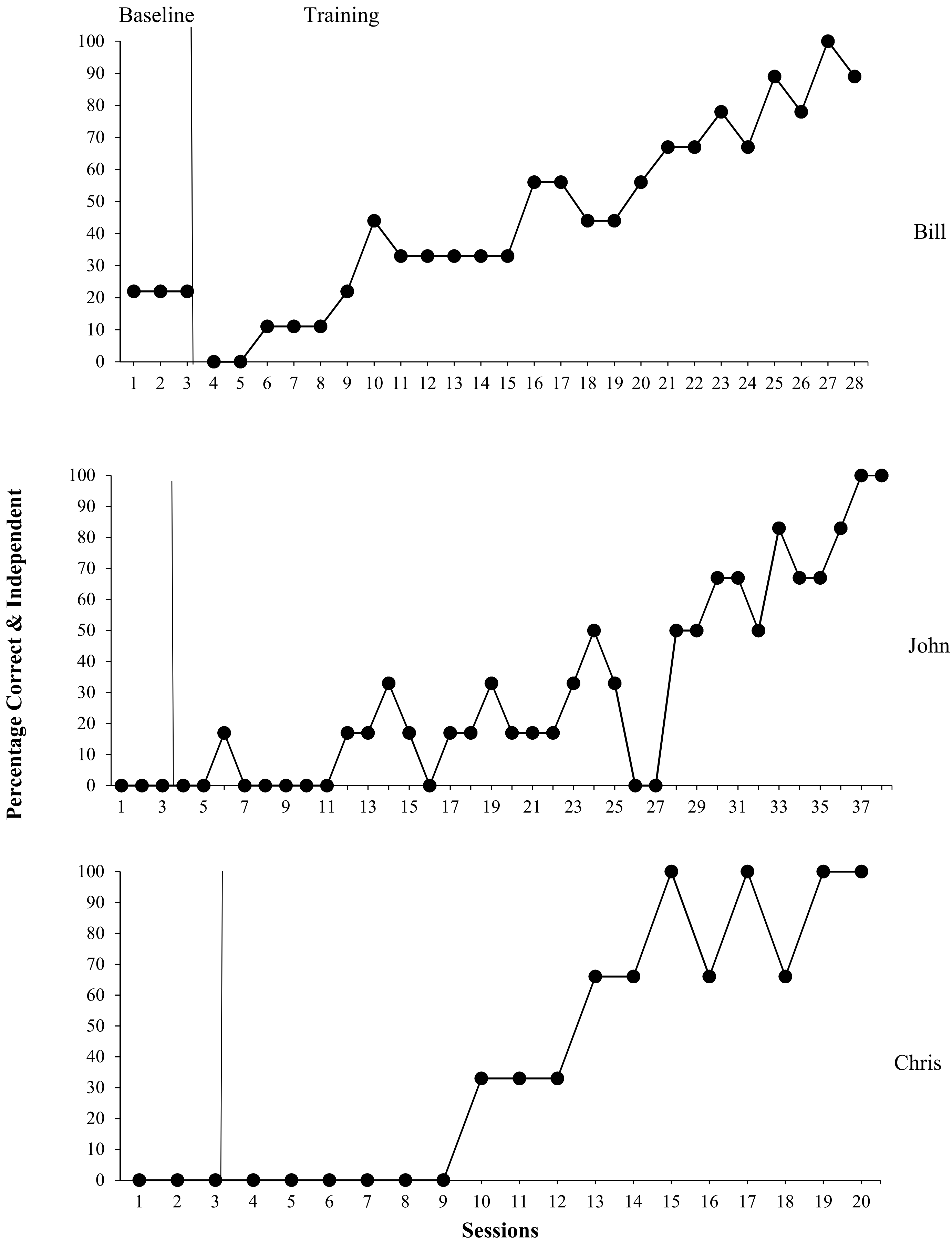

Figure 3. Percentage of steps completed correctly by Bill (zipping up coat), John (six-piece block design), and Chris (three-piece block design) during chained task.